

*Full Length Research Paper*

## **Investigation of cluster cases of urinary bilharziasis in the health area of Klemeklo, Northwest Bouake, 2017**

**S. I. Soumahoro<sup>1,2\*</sup>, D. P. Kouassi<sup>1,2</sup>, K. D. Zika<sup>3</sup>, M. Coulibaly<sup>1</sup>, A. D. Kouame<sup>1,2</sup>, S. Yéo<sup>1</sup>, A. M. Sokodogo<sup>1</sup>, E. A. E. Amani<sup>3</sup>, M. S. M. L. Tanoh<sup>3</sup>, A. Moumouni<sup>4</sup>, G. H. A. Yao<sup>1,2</sup>, M. -E. Ebouat<sup>2,3</sup>, K.D Adoubryn<sup>3</sup>, N. S. Dagnan<sup>5</sup>**

<sup>1</sup>Regional Office, National Institute of Public Hygiene, Bouaké, Cote d'ivoire.

<sup>2</sup>Department of Public Health, Alassane Ouattara University, Bouaké, Cote d'ivoire.

<sup>3</sup>University Hospital, Bouaké, Cote d'ivoire.

<sup>4</sup>Ministry of Public Health, Population and Social Affairs, Niger.

<sup>5</sup>Department of Public Health, Felix Houphouet Boigny University, Abidjan, Cote d'ivoire.

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**Bilharzia is one of the major neglected tropical diseases with high morbidity in poor countries in tropical regions. In Côte d'Ivoire, the prevalence of bilharziasis varies from less than 1% to over 90%, depending on the region. It is the highest among school-age children. In March 2017, an epidemiological investigation of clustered cases of urinary bilharziasis was conducted in the village of Gbangaoukli, a health area in the Bouaké North-West district. This was the descriptive phase of an investigation report, which consisted of detecting all the cases, describing them and confirming them biologically. The aim was not to determine the aetiology of the phenomenon, as the description of the cases met the definition of suspected cases of urinary bilharziasis. The investigation was conducted in March 2017 in the village of Gbangaoukli, a health area in the Bouaké North-West district. The investigation consisted of an active search for cases in the village, based on a definition of suspected cases of urinary bilharziasis. 119 suspected cases have been identified. Suspected cases were interviewed using a questionnaire, and urine and stool samples were taken. Urine samples were analyzed by the urine centrifugation method and stool samples by the simplified Ritchie technique. The data collected were analyzed using Epiinfo 7.0 software. Prevalence was estimated at 47.9% in children under 15. Bathing in a river close to the village (89.92%), washing in the river (88.24%) and faecal peril (74.79%) were all reported. All 10 urine samples taken were positive (100%) for *Schistosoma haematobium*. The habits that can lead to urinary bilharziasis have been proven and well-documented. The aim of this investigation was to identify these habits. Urinary bilharziasis in Côte d'Ivoire continues to affect the most vulnerable populations, especially children living in areas without a drinking water supply.**

**Key words:** Bouaké, epidemiology, Ivory Coast, urinary bilharziasis.

### **INTRODUCTION**

Neglected Tropical Diseases (NTDs) affect more than 1 billion people in 149 countries (WHO, 2019). All NTDs

require WASH (Safe water, sanitation and hygiene) to sustain elimination and control efforts and for morbidity

\*Corresponding author. E-mail: [ssoryibrahim@yahoo.fr](mailto:ssoryibrahim@yahoo.fr).

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management (WHO, 2019). Schistosomiasis is a NTD. Over the last decade, progress has been made towards achieving schistosomiasis morbidity control in several countries in the sub-Saharan African region, although more remains to be done (Deol et al., 2019). Its morbidity is particularly high in poor tropical countries in Africa, Asia and Latin America (Odhiambo et al., 2014). The number of people exposed worldwide is estimated at 600 million, with more than 200 million people infected and nearly 280,000 deaths each year, 97% of which occur in Africa, south of the Sahara (GBD, 2017; Ahamide et al., 2023), with 90% of those infected requiring treatment (N'Guessan et al., 2017). In Côte d'Ivoire, the prevalence of bilharziasis varies from less than 1% to over 90% depending on the region (Cecchi et al., 2007). It is the highest among school-age children (Senghor et al., 2014; Degarege et al., 2015; M'Bra et al., 2018). In March 2017, following a report of clustered cases of hematuria in mostly school-age subjects in the village of Gbangaoukpli, a health area in the North-West Bouaké district, an epidemiological investigation was conducted in the said village. The aim was to confirm and describe the phenomenon, and then launch a response. A multidisciplinary team led by epidemiologists from the Regional Public Health Office and the Bouaké Nord-Ouest health district, and biologists from the parasitology laboratory at Bouaké University Hospital, carried out the investigation.

## METHODOLOGY

This was the descriptive phase of an investigation report, which consisted of detecting all the cases, describing them and confirming them biologically. The aim was not to determine the aetiology of the phenomenon, as the description of the cases met the definition of suspected cases of urinary bilharziasis. The investigation was carried out in the village of Gbangaoukpli in the Klemeklo health area of the Bouaké North-West Health district. This health area is located at 42 km from Bouaké. The population is estimated at 549, including 219 children under 15 (40%). The investigation consisted of an active search for cases in the village, based on a definition of suspected cases of urinary bilharziasis. The definition of a suspect case was as follows: any person presenting with hematuria. Information was given door-to-door by the community health worker. Suspected cases were interviewed using an anonymous questionnaire, and urine and stool samples were taken. These samples were sent to the Bouaké University Hospital laboratory for analysis. A total of 119 cases of suspected urinary bilharziasis were detected. Urine samples were analyzed using the urine centrifugation method, while stool samples were analyzed using the simplified Ritchie technique. The data collected were analyzed using Epiinfo 7.0 software.

## RESULTS

### Sociodemographical characteristics

The population of this village was estimated at 549, including 219 children under 15 years old. The respective

prevalences were 21.67% in the general population and 47.9% in children under 15. The average age of the subjects was 10.38 years, with a predominance of those aged 4 to 15 (88.2%). The infection in the is male more than female (62.2%), that is, a sex ratio of 1.64:1 and 84.03% were school children (in or out of school) (Table 1).

### Clinical characteristics

Questioning revealed swimming in a river (Figure 1) close to the village (89.92%), washing clothes (88.24%) and faecal peril (74.79%) in the river in question. Episodes of previous hematuria were reported in 25.2% of subjects, with a history of Biltricide treatment in 5.88%. Regarding the current episode, hematuria occurred at the end of micturition (97.5). It was variable in time (92.4%), of stationary evolution (96.6%), associated with pruritus (78.15%), mictional burning (72.29%), and abdominal pain (26.05%) (Table 2).

A total of 10 urine samples and 10 stool samples were taken from suspected cases. All samples were positive (100%) for *Schistosoma haematobium*. None of the stool samples were positive for *Schistosoma mansoni*, but 1/10 were positive for *Giardia intestinalis* and 2/10 for *Entamoeba coli* (Table 3).

## DISCUSSION

In poor countries, school-age children are most at risk of bilharziasis (Maru, 2015). In our study, the prevalence of urinary bilharziasis was estimated at 47.9%. Overall prevalence was 12.5% among school children on the south-western shore of Lake Malawi (Kayuni et al., 2017), and 12.9% in Khartoum, Sudan (Hajissa et al., 2018). In Senegal, this prevalence was also high in the same age group (Senghor et al., 2014), as in Ethiopia (Degarege et al., 2015). In Korhogo, northern Côte d'Ivoire, the prevalence of *S. haematobium* schistosomiasis was estimated at 0.3% (M'Bra et al., 2018). The high prevalence found in this case is linked to the proximity of the river to the village, which favours bathing by school-age children (89.92%) and other household activities such as washing clothes in the river (88.24%), and above all faecal peril (74.79%), which maintains reinfestation of the water course. Activities that bring children, whose immune systems are still immature, into contact with a source of stagnant water make them more vulnerable to the disease (Bajiro et al., 2016; Mupakeleni et al., 2017; Hajissa et al., 2018).

The signs presented by these children are also found in the literature. Schistosomiasis can also cause nutritional deficiencies, anaemia, physical failure and memory problems (Zhang et al., 2007). Studies have even revealed fertility disorders in women living in areas with a high prevalence of urinary bilharziasis (Woodall et al.,

**Table 1.** Socio-demographics characteristics of suspected cases of bilharziasis

Variable	Modalities	Numbers	Percentage
Age (year old) (n=119)	Infant to 15	105	88.2
	≥15	14	11.8
Sex (n=119)	Male	74	62.2
	Female	45	38.2
Profession (n=119)	Student (in or out of school)	100	84.03
	Others	19	15.97

**Figure 1.** River near Klemeklo village, northwest Bouaké, 2017.**Table 2.** Clinical characteristics of suspected bilharziosis cases.

Variable	Modalities	Numbers	Percentage
Presence of a nearby water stream	Yes	119	100
	No	0	0
Concept of bathing	Yes	107	89.9
	No	12	10.1
Notion of washing	Yes	105	88.24
	No	14	11.76
Concept of fecal peril	Yes	89	74.79
	No	30	25.21
Previous episode of hematuria	Yes	30	25.2
	No	89	74.8
Previous biltricide treatment	Yes	7	5.88
	No	112	94.12
<b>Current episode</b>	Variable	110	92.4
Hematuria schedule	Morning	3	2.5
	Mid-day	3	2.5
	Mid-day and evening	2	1.7
	Every hour	1	0.8

**Table 2.** Cont'd

Spontaneous evolution	Favorable	4	3.4
	Stationary	115	96.6
Pruritus	Yes	93	78.15
Urinary burning	Yes	86	72.3
Abdominal pain	Yes	31	26.05

**Table 3.** Biological test results.

Collection	Isolated pathogen	Numbers	Percentage
Urine: 10 samples	<i>Schistosoma haematobium</i>	10	100
Stool: 10 samples	<i>Schistosoma mansoni</i>	0	0
	<i>Giardia intestinalis</i>	1	10
	<i>Entamoeba coli</i>	2	20
	No parasites	7	70

2018), and bladder and colorectal cancers in the case of intestinal bilharziasis (Herman et al., 2017; Ismail et al., 2014). In view of these complications, it is essential to prevent the disease in these children. Controlling the disease requires the provision of safe drinking water, improved sanitation measures and raising children's awareness of the need to avoid bathing in untreated water. In addition to these control measures, mass chemoprophylaxis of these children and the use of molluscides will prevent reinfestation (Wang et al., 2012; Webster et al., 2013; Ekanem et al., 2017; Chisango et al., 2019). Men outnumbered women in our study. Historically, men of all ages are more likely to expose themselves to certain risks than women. This natural inclination to take risks means that men are more likely to suffer physical injury. Ayabina et al. (2021) in a systematic review suggest that males are significantly more likely to be infected than females and that the higher the baseline prevalence, the lower the *M:F* prevalence of infection ratios for both *Schistosoma* species. The results of Ayabina et al. (2021) suggest males are at an increased risk of exposure to contaminated water bodies. One plausible explanation is gender-related occupational roles, for example, in some of the studies, men spent more time fishing and practicing irrigation farming (Russel et al., 2020; Tefera et al., 2020). Our study found some risky behaviours: washing, bathing in the nearby water stream. Peril fecal was also found in our study. WASH are crucial for human health and well-being. Yet, millions of people globally lack adequate WASH services and consequently suffer from or are exposed to a multitude of preventable illnesses. Lack of safe WASH negatively impacts quality of life and undermines fundamental human rights (WHO, 2019). Also, in some study areas due to religious and sociocultural reasons, females are prohibited or at least

discouraged from participating in activities such as swimming and fishing and are therefore exposed less often to infection (Sulieman et al., 2017; Lee et al., 2019). Although females have some exposure activities which are particular to them, such as household chores, like washing dishes and doing laundry in contaminated water bodies, this seems not to be enough to increase their probability of infection beyond that of their male counterparts within the same communities. This has been attributed to the fact that their water contact activities involve the use of soap which may have a cercaricidal effect and thus reduce their risk whilst exposed to contaminated water (Sow et al., 2011). There are, however, instances where this does not hold true in a Kenyan study, a higher prevalence of infection in females was not directly linked to exposure patterns (Satayathum et al., 2006). Females had a significantly higher prevalence of *S. haematobium* infection even though males were reported to have more water contact. In some cases, this was not the first episode of haematuria. This may suggest that schistosomiasis is an acute or chronic disease. Human schistosomiasis is an acute and chronic parasitic disease caused by infection with blood flukes (trematode worms) of the genus *Schistosoma* (WHO, 2022). Previous treatment with biltricide had been received by some subjects. Some endemic territories had previously received a mass biltricide administration campaign. This is the case of Cote d'Ivoire (WHO, 2022). Symptoms are generally non-specific in acute episode gastrointestinal symptoms could be found.

## Conclusion

Urinary bilharziasis in Côte d'Ivoire continues to affect the most vulnerable populations, children living in areas

without a drinking water supply. These school-age children are the most vulnerable. The disease could have an impact on their school performance, as well as long-term medical consequences. Intensified control measures are essential to bring the phenomenon under control.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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